PHUKET SMART CITY INNOVATION MODEL FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT
Smart City It is a form of digital technology application or information and communication that enhances the efficiency and quality of community services to help reduce costs and reduce the consumption of the population. By continuing to increase efficiency, people can live a better quality of life. The objectives of this research were: 1) to study the importance of smart city innovation in Phuket for sustainable development; and 2) to study factors affecting smart city innovation in Phuket for sustainable development. Use questionnaires to collect data from Household representatives in Phuket. 399 people used statistics to analyze the data, including frequency, percentage, mean, standard deviation, and multiple regression analysis. The research findings were as follows: 1) Smart City Innovation in Phuket for Sustainable Development The overall and individual aspects are important at a high level. Occupational aspects of people's transportation Public administration and the environment, respectively. 2) Government policy factors include infrastructure, public participation, and technology acceptance. Influencing Phuket Smart City Innovation for Sustainable Development 67.3%
Keywords: Innovation, smart city, sustainable development

INTRODUCTION

A smart city is a form of digital technology application or information and communication that enhances the efficiency and quality of community services to help reduce costs and reduce the consumption of the population. By continuing to increase efficiency for people to live a better quality of life, Smart cities are a project that many cities around the world are trying to develop to meet the 4.0 era. By combining technology with the lives of the people, whether in terms of transportation, power consumption, or infrastructure, making the city comfortable like a dream can actually happen. It also makes people live happily. The concept of a smart city coincides with the leapfrog development of Internet of Things (IOT) technology, which is the foundation for connecting devices or objects around the world to a communication network. Internet, including intelligent urban planning Supporting a comfortable lifestyle, the Smart City style of city management is creating a city that will grow sustainably. Emphasis on balancing the environment, saving energy, and choosing to use clean energy, thereby reducing environmental problems. Problems of air pollution, wastewater, garbage, and drainage help promote a good environment. Good air quality increases green areas and reduces the heat island effect, although Thailand does not yet have a complete Smart City. But it is driving the development of targeted areas that have been selected as prototype smart cities in 7 provinces, namely Bangkok, Chiang Mai, Phuket, Khon Kaen, Chonburi, Rayong, and Chachoengsao, with the cooperation of 3 ministries, namely the Ministry of Energy, the Ministry of Transport, and the Ministry of Digital Economy and Society, who have formulated a smart city development master plan with guidelines to drive smart city development (Engineering Today, 2020).

The term "smart city" does not refer to a city where fiber optics are installed and different technologies are put into it. Everything uses technology, which means a city that takes advantage of modern and intelligent technologies and innovations to increase the efficiency of city services and management, reduce costs, and maximize resource utilization for the city and its target population with an emphasis on good design and participation of the business and public sectors in urban development under the concept of livable city development. Modern cities provide urban citizens with a good quality of life, happiness, and sustainability (Kanoknukulchai, W., 2020). The need for urban development to be a smart city (Sumalee, E. and Tanchai, C., 2019) 1) The need for smart cities to solve big city problems medium and small cities in which Each city has different problems, obstacles, and solutions, which may be the same or different in terms of size, quantity, population, and resources that are not equal. 2) the necessity and response of society in the information age, globalization, digital society, and the elderly and disabled society. Information and communication technology can be used to respond. 3) Responding to the diverse needs of urban and rural societies Urban and rural societies have dimensions of diversity in size and urban resource development. They attract resources from outside the city, such as water, food, and clean air, but the city retains prosperity and knowledge, so income distribution does not come down to the countryside. population evacuation More and more people from the countryside are coming to the city, causing more and more problems with urbanization as well. The distribution of income, prosperity, and knowledge to the countryside will alleviate the problem of urban density. 4) The urgent need to participate Public participation is essential.

Thailand Announcing a policy to drive the digital economy and society (the digital economy) that will focus on driving smart cities. as a mechanism to create opportunities for the expansion of a better local economy (Ministry of Digital Economy and Society, 2017). The genius has arrived. What are the components? How will it be? And what should be changed to make it appropriate and in line with the Thai way of life? smart city development It is considered an important urban development plan, according to the strategy "Thailand 4.0" to be a residence in the future. taking into account the dimensions of quality of life, environment, culture, comfort, and safety. Energy-saving management is the center of education and an important

source of knowledge. Technology is used digitally to manage resources and public utility services necessary for economic development and society in the future. An example of a pilot project currently underway is the Phuket project. Smart City of the Ministry of Digital Economy and Society in collaboration with the private sector and urban and industrial development projects for the Smart City of the Ministry of Energy and the private sector, etc. (Araya Preechametta, 2018)

Phuket is now ready for development to become a "Smart City." "Phuket" is probably the name that comes to mind first. As a small city with a high rate of economic growth from tourism and investment, especially from foreigners, the necessary infrastructure is relatively complete. In 2015, Phuket was selected as the first pilot city in the Smart City development project under the policy to increase the country's economic potential by driving the digital economy of the government. It is also an important mechanism to support the development plan according to the approach to driving the country toward Thailand 4.0 which is about to happen. Phuket Smart City is a project to promote a special area for the digital economy. It was born on the initiative of the Ministry of Digital Economy and Society and the municipality of Phuket. These are two areas with high urbanization. (Department of Digital Economy Promotion, 2017) has made over the years. The tourism industry in the province has been continuously developed until now. Phuket has become one of the country's fastest-growing and most prosperous small towns and is ranked among the top 15 tourist destinations in the world. with the readiness of ICT infrastructure such as communication networks that are thorough, fast, and highly stable. It is also one of the cities designated as the future industrial city for high-tech businesses. This will help strengthen the industry for the entire system (SIPA, 2017).

From the importance of smart cities above, it can be concluded that a smart city is a form of digital technology application, information, and communication that enhances the efficiency and quality of community services to help reduce costs and reduce the consumption of the population. In addition, Thailand faces the problem of congestion in both housing and traffic. and environmental conservation The researcher therefore sees the importance of applying innovation to solve the problems mentioned above. Therefore, I am interested in studying "Phuket Smart City Innovation for Sustainable Development" to use the information as a guideline for the development of smart city innovation in Phuket to be more efficient.

LITERATURE REVIEWS
concepts and theories about smart city development

Smart city refers to a city that uses digital technology or information and communication technology to promote the quality and efficiency of city services, reduce costs and the use of resources, and play a more active role and contribute. of the population is increasing. Doing so will allow the city to make more efficient use of existing transportation, utilities, and infrastructure. Helps to learn about the change or development of the city faster. It can also reach people of all classes. and various under the same conditions that can reduce social inequality (Tapananont et al., 2018: 4), in line with Glasmeier & Christopherson (2015: 6), saying that a smart city is a new market with waste management and traffic control. The use of technology to facilitate urban sub-systems such as energy, water, mobility, and the building environment provides employment opportunities. Wealth creation and economic growth demand added value and innovation. But they also neglect health care and sustainability. Living beings working Mobility, Public facilitation, and Information Disclosure Meijer & Bolívar (2016: 393, 399) say that a smart city has a focus on technology, human resources, and governance. choice Policy and implementation of the decision-making process Structural and Process Changes, and Angsukanjanakul (2017: 252) stated that a smart city is a concept of innovative urban development that can reduce pollution problems, promote a friendly environment, increase the use of clean energy, and be able to manage resources efficiently and

effectively. In addition, the Strategy and Evaluation Office (2019) concluded that a smart city refers to a city that takes advantage of modern and intelligent technology and innovation to increase the efficiency of city services and management. Reduce costs and resource consumption. By emphasizing the participation of the business sector and the public sector in urban development. Under the concept of modern livable city development for people in the city to live happily and sustainably, it can be concluded that a smart city is a management concept that covers urban development with an emphasis on improving the quality of life, employing jobs, increasing business opportunities, and innovation in competition innovation. Applying information technology to increase the efficiency of service provision in all sectors, such as transportation systems, water supply, electricity, security systems, etc., in order to cover and thoroughly provide services in urban areas. From the literature review, we were able to formulate research hypotheses.

The Digital Economy Promotion Agency (2019) has classified smart cities into 7 components as follows: 1) A smart environment is a city that focuses on improving quality and increasing efficiency. management effectiveness and monitoring systematic environment and environment, such as water management and climate care. Disaster surveillance, as well as increasing public participation in natural resource conservation. 2) Smart mobility is a city that focuses on increasing convenience, efficiency, and safety in travel and transportation. And environmentally friendly. 3) Smart living (smart living) is a city that focuses on providing services that facilitate living, such as health services, for people to have good health and well-being, especially to prepare for the aging society. Increasing public safety through crime surveillance 4) A smart city (smart people) is a city that focuses on developing citizens to have knowledge and be able to apply technology to benefit both economically and sustainably. life Create an environment that fosters creativity and informal learning. Including promoting coexistence with social diversity. 5) Smart energy (smart energy) is a city that focuses on increasing the energy efficiency of the city. Or use alternative energy as clean energy (renewable energy), such as biomass fuel. electricity from renewable energy, electricity from other energy sources, etc. 6) A smart economy (smart economy) is a city that focuses on increasing efficiency and flexibility in business operations. Create business links and cooperation and apply innovation in development to transform businesses (e.g., smart agricultural cities, smart tourism cities, etc.) and 7) smart governance, which is a city that focuses on developing a service system for people to access government services conveniently and quickly, increasing channels for public participation. Including allowing the public to access information, resulting in transparency and verifiability.

Tapananont et al. (2018: 4) discussed the factors affecting smart city innovation for sustainable development, consisting of the following: 1) Government policy means a broad approach that the government of a country has set up as a project, a plan, or a schedule in advance as a way to direct various practices according to both to achieve the goal. 2) Infrastructure refers to the construction and basic system that supports the expansion of the community and comes with Utilities (water supply, wastewater treatment, electricity, waste disposal), transportation systems (roads, railways, ports, airports, piping systems), communication systems (telephone network, Internet signal), etc. 3) Public participation means giving people the opportunity to participate in initiatives, discretionary practices, and responsibilities in matters affecting them to be able to enable people to participate in local development to solve problems and bring about better living conditions for the people; and 4) accepting technology means using accepted technology that creates Benefits for individuals or various changes related to behaviors, attitudes, and easier use of technology. In addition, the adoption of technology gives individuals additional experience, knowledge, and skills.

According to the literature review, the following research hypothesis can be formulated:

H1 Government Policy Factors, Infrastructure, Public Participation, and Technology Adoption Influence Phuket's Smart City Innovation for Sustainable Development.

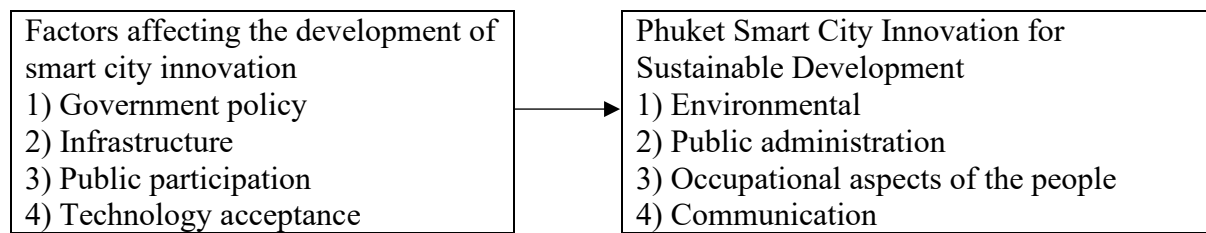From the literature review, the conceptual framework can be drawn as shown in Figure 1.

Factors affecting the development of smart city innovation 1) Government policy 2) Infrastructure 3) Public participation 4) Technology acceptance	→	Phuket Smart City Innovation for Sustainable Development 1) Environmental 2) Public administration 3) Occupational aspects of the people 4) Communication

Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

The population in this study was Household representatives in Phuket, 134,156 households (National Statistical Office, 2021), and a sample of 399 people was obtained from the Yamane sample calculation formula (Taro Yamane, 1973). Stratified random sampling (stratified sampling).

The research tool was a questionnaire consisting of part 1: personal factors of the respondents, namely sex, age, education level, marital status, average monthly income, and occupation.Part 2: Factors Affecting the Development of Smart City Innovation The nature of the questionnaire is a Likert Scale with 5 scoring criteria: the highest equals 5 points, the high equals 4 points, the medium equals 4 points, the least equals 2 points, and the least equals 1 point. Part 3: Smart City Innovation in Phuket for Sustainable Development The nature of the questionnaire is a Likert Scale with 5 scoring criteria: the highest equals 5 points, the high equals 4 points, the medium equals 4 points, the least equals 2 points, and the least equals 1 point.

Before using data collection tools Objective conformity (IOC) and questionnaire validity tests via Cronbach's alpha were performed systematically. The examination found that the IOC was 0.886 and Cronbach's alpha was 0.983, indicating that the research tool was of sufficient quality (Polit & Beck, 2006; Hair et al., 2012) to provide information. This study sent questionnaires to representative households in Phuket.Descriptive statistics were used to analyze the data, including frequency, percentage, mean, standard deviation, and multiple regression analysis.

RESEARCH RESULTS

1) Most respondents percent 67% are female, 65% are aged between 31-40 years old, 58% graduated from junior high school, 58% have an average monthly income between 20,000 - 25,0000 baht, and 67% are engaged in trade.

2) Phuket Smart City Innovation for Sustainable Development The overall and individual aspects are important at a high level. Occupational aspects of people's transportation Public administration and the environment, respectively, as shown in Table 1.

Table 1 Mean and Standard Deviation of Phuket Smart City Innovation for Sustainable Development

Aspect	Description	$\bar{\text{X}}$	S.D.	Interpretation of results
1	Environmental	3.95	0.56	Much
2	Public administration	3.98	0.49	Much
3	Occupational aspects of the people	4.08	0.62	Much
4	Communication	4.03	0.53	Much
Total		**4.01**	**0.40**	**Much**

3) Government policy factors had a β value of 0.132, infrastructure had a β value of 0.418, public participation had a β value of 143, and technology adoption had a β value of 0.134, indicating that it had a positive influence on smart city innovation. of Phuket for sustainable development with statistical significance at the 0.05 level with the Sig. values of 0.000, 0.022, and 0.006, which are in line with the hypothesis set. When analyzing the correlation coefficient (R), it was 0.872, indicating that the group of independent variables had a strong relationship with the dependent variable. and the forecasting coefficient was 0.673, indicating that the group of independent variables had a 67.3% effect on Phuket's smart city innovation for sustainable development.

In order, the equation can be written as follows.

$$Y = 1.336 + 0.132X_1 + 0.418X_2 + 0.143X_3 + 0.134X_4$$

From the analysis of the regression coefficient, it was found that the factors of government policy, infrastructure, public participation, and technology acceptance have the ability to jointly predict Phuket's smart city innovation for sustainable development. The infrastructure factor had the most impact on forecasting (Beta = 0.245), followed by public participation (Beta = 0.093), technology adoption (Beta = 0.088), and government policy (Beta = 0.079). Details are shown in Table 2.

Table 2 Multiple regression analysis of factors influencing smart city innovation in Phuket for sustainable development.

Factors	Unstandardized (b)	SE	Standardized (β)	t	Sig.
(constant value)	1.336	0.106		12.635	.000
Government policy (X_1)	0.079	0.029	0.132	2.763*	0.004
Infrastructure (X_2)	0.245	0.028	0.418	8.869*	.000
Public participation (X_3)	0.093	0.040	0.143	2.300*	.022
Technology acceptance (X_4)	0.088	0.031	0.134	2.787*	.006
R = 0.872		Adjusted R^2 = 0.673			
R^2 = 0.760		SE = 0.152			

* Statistical significance at the 0.05 level

DISCUSSION & CONCLUSION

A Study of Phuket Smart City Innovation for Sustainable Development The researcher brought up important issues to discuss the results according to the research objectives, as follows:

1) Phuket's smart city innovation for sustainable development, overall and in each aspect, is at a high level. People's occupations, transportation, government administration, and the environment Respectively, the aforementioned case should come from the smart city policy perspective. The smart city is a form of application of digital technology, information, and communication to increase the efficiency and quality of community services and reduce costs. And reduce the consumption of the population while still increasing efficiency so people can live a better quality of life. Smart City is a project that many cities around the world are trying to develop to meet the 4.0 era by combining technology with the lives of the people, whether in terms of transportation, energy consumption, or the infrastructure that will make a dream-like, comfortable city a reality. It also makes people live happily. The concept of a Smart City coincides with the leapfrog development of Internet of Things (IOT) technology, which is the foundation for connecting devices or objects around the world to a communication network. Internet, including intelligent urban planning Supporting a comfortable lifestyle, the Smart City style of city management is creating a city that will grow sustainably. Emphasis on balancing the environment, saving energy, and choosing to use clean energy, thereby reducing

environmental problems. Problems of air pollution, wastewater, garbage, and drainage help promote a good environment, good air quality, increase green space, and reduce the heat island effect (Heat Island Effect). As a result, people pay attention to innovation. very much This is in line with Akradet's research results. Phromkan et al. (2020) studied knowledge development and the components of the creative "Smart Community" of communities in Thai society. The study found that The development of knowledge and the components of the creative community "Smart Community" in Thai society were at a high level in all aspects.

2) Government policy factors, infrastructure, public participation, and technology acceptance influence Phuket's smart city innovation for sustainable development by 67.3%. This may be due to sector policies. The government supports the development of smart cities. There is an infrastructure to support smart cities in the future and promote the participation of the people in the development of smart cities, and people accept the technology used to develop smart cities, resulting in smart city innovation. of Phuket for more sustainable development Consistent with the research results of Samita Tempermpoon (2020), she has studied the success factors affecting the development of the smart city of the People's Republic of China: a case study of Shanghai. The results revealed that factors such as government policy, infrastructure, public participation, and technology adoption influence the development of the smart city in the People's Republic of China.

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